



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

THE BRYOLOGIST.

VOL. VII.

JULY, 1904.

No. 4.

FURTHER NOTES ON CLADONIAS.—III.

Cladonia furcata and Cladonia crispata.

BRUCE FINK.

After *Cladonia fimbriata*, perhaps the assemblage of lichens included in the two species in the above title are as troublesome as any. However, Tuckerman, in his treatment of the various forms of these two species, came much nearer to a correct solution than he did with regard to *C. fimbriata*, the species treated in the last paper of this series (BRYOLOGIST, 7:2. 1904). Indeed, though *C. furcata* var. *crispata* of Tuckerman's "Synopsis" has seemed difficult to trace, and though *C. furcata* var. *pungens* has seemed hardly to belong with the species, yet the disposition has been as a whole fairly satisfactory. Wainio has seen fit to remove the latter variety from the species, placing it with *Cladonia rangiformis*, and this appears surely to be an improvement. The former variety Wainio has also removed from the species under the name, *Cladonia crispata*. This species as viewed by Wainio seems to be well represented in Europe, where there are quite a number of varieties. However, in America, we have as yet only two of the varieties, and there is room for doubt as to whether, for our purpose, it is best to consider these forms as distinct from *Cladonia furcata*. Indeed, our *Cladonia crispata* var. *infundibulifera* seems very near to *Cladonia furcata* var. *paradoxa*, and further study is necessary to decide whether Wainio's view is the best one. But, though there may be some doubt as to best disposition of the puzzling *Cladonia crispata*, the study of the Minnesota *Cladonias* has brought to light one new variety within the two species, two others not previously known in North America, and still another known only through a single specimen collected many years ago by Tuckerman.

Regarding the illustrations, we are fortunate enough this time to be able to give them all from material that has been examined by Dr. Wainio. As to the American distribution of the varieties, it will be readily seen that with the exception of two of the first species, little is definitely known. A large amount of material in various herbaria I have not been able to examine, and a study of this would add greatly to the distribution. For the sake of the information to be gained, I should be willing to examine the material in any herbarium under either of the specific names given in our title above, and should likewise gladly examine material recorded as *Cladonia fimbriata*, the species treated in the last paper of the series. However, this would still leave untouched any material belonging to these three species, but placed elsewhere in various herbaria. With this much of preliminary statement, we may now consider the various forms of the two species.

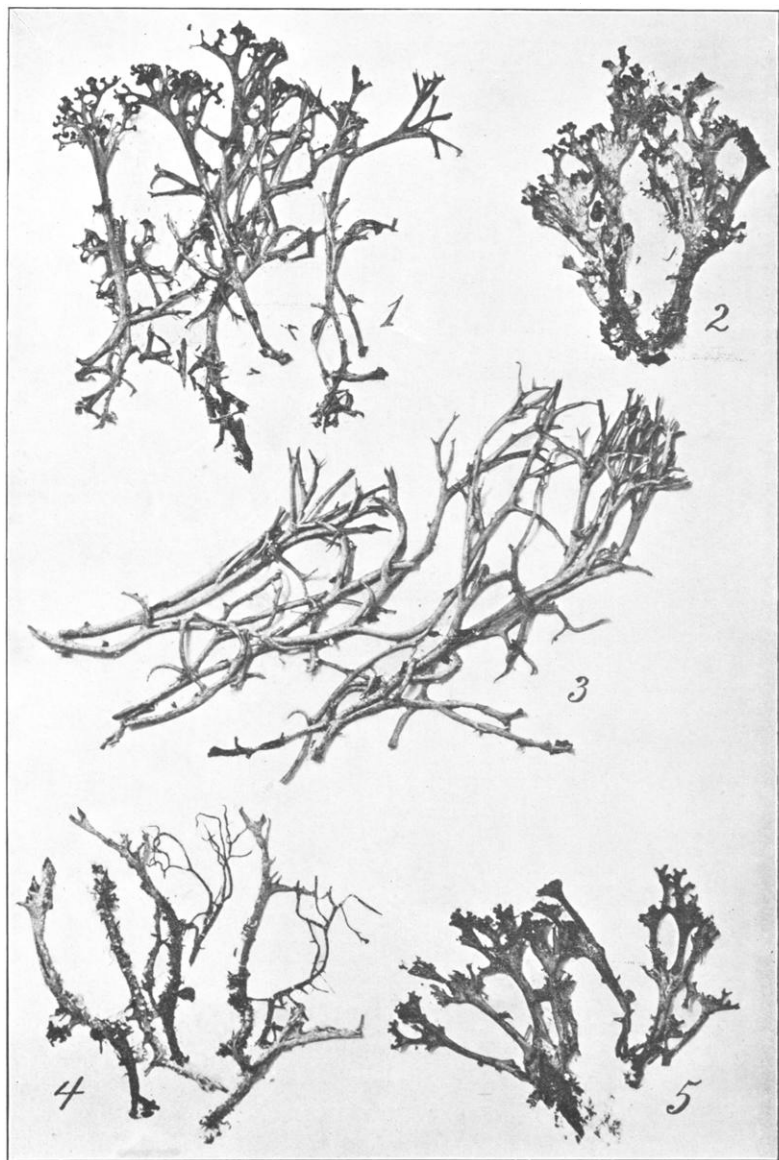


PLATE VII. Fig. 1. *Cladonia furcata* var. *racemosa*. Fig. 2. Var. *Finkii*. Fig. 3. Var. *primata*. Fig. 4. Var. *scabriuscula*. Fig. 5. Var. *paradoxa*. $\times 1$.

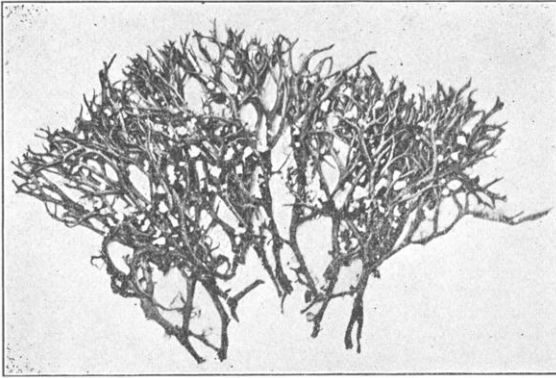


Fig. 1. *Cladonia furcata* $\times 1$.

or flat, scattered or clustered, sea-green varying toward brownish or whitish above and white below, the cortical layer continuous. Podetia arising from the surface of the evanescent squamules, the lower portion dying away and the apical growth continuing, 15–85 mm. long and .7–2 mm. in diameter, cylindrical or subcylindrical, rarely scyphiform, dichotomously or more or less irregularly or radiately branched, erect or rarely decumbent or even prostrate, rarely somewhat sorediate, the cortex continuous, subcontinuous or more or less dispersed, smooth or rarely subrugose, sometimes more or less squamulose, sea-green varying toward whitish or brownish, the branches suberect, divaricate or recurved, the axils somewhat dilated and frequently perforated, the apices suberect or recurved, slender and delicate. Apothecia small, .5–1.5 mm. in diameter, irregularly or cymosely disposed at the apices of the branches, immarginate, sometimes lobate or reniform, convex and rarely perforate at the centre, brown varying toward brick-red or a paler color. Hypothecium pale. Hymenium brownish above and cloudy below. Paraphyses commonly thickened and brownish toward the apex. Asci clavate or cylindrico-clavate, the apical wall not always thickened.

Widely distributed in North America in one form or another, most of the material, however, being assignable to one of the varieties below. Plants not belonging to the varieties are frequent enough where I have collected in parts of Iowa and Minnesota. The plant used for illustration and examined by Dr. Wainio was collected at Fayette, Iowa. Macoun's "Canadian Lichens," No. 53, belongs here and not in the variety below. Cosmopolitan also in its foreign distribution. The form figured was sent out as the species in my "Iowa Lichens" of 1894–5, and may be found in a large number of American and European herbaria.

CLADONIA FUR-
CATA (Huds.)
Schrad. Spicil. Fl.
Germ. 107. 1794.
Fig. 1.

Primary thal-
lus usually dis-
appearing, but
when present com-
posed of medium
sized squamules,
which are cren-
ately or irregularly
lobed or rarely
subentire. .2–5
mm. long and
wide, ascending

CLADONIA FURCATA (Huds.) Schrad. var. RACEMOSA (Hoffm.) Flk. Clad. Comm. 152, 1828. Plate VII. Fig. 1.

Podetia of the full length of the species or even reaching 150 mm., dichotomously or in part subradiately branched especially toward the apex, cylindrical or subcylindrical, slightly or considerably thickened at the frequently cleft or plainly open axils, the sides closed or more or less open in places, without squamules or squamulose toward the base, cortex subcontinuous or more or less areolate, color as above or perhaps more inclined toward variegated conditions. Apothecia quite commonly present and on corymbose or cymose branches.

Dr. Wainio says, "In America septentrionali haud est rara," basing his statement upon the distribution given in Tuckerman's "Synopsis," and citing Nos. 32 and 33 of Tuckerman's "Lichenes Americani septentrionalis," these two numbers coming from the White Mountains. Though the view of the two men regarding the variety is not quite the same, we may perhaps accept Tuckerman's statement that the variety is general in its northern distribution, also "probably occurring in the southern states, at least in the mountains." However, the variety is not common where I have collected in the west, and of all the material sent Dr. Wainio, he places here only the plant collected in 1848 by C. C. Parry (Fink, B. Proc. Iowa Acad. Sci. 2:137. 1895), and of this Wainio says, "*C. furcata* v. *racemosa* in v. *Finkii* transiens." Calkins' "North American Lichens," No. 93, from Tennessee, and "Lichenes Boreali-Americani," Nos. 61 and 184, from Virginia and New Hampshire, are good representatives of the variety, though the varietal characters are by no means well shown in all the specimens sent out under these numbers. Also a plant from Delaware, collected by A. Commons belongs here, but also approaches var. *Finkii*. I have collected the variety at Cambridge, Massachusetts, and have it from the White Mountains, collected by W. G. Farlow. Thus the typical specimens seem to come from the east, and there is much doubt about the western distribution. Finally the variety is often confused with plants of other species such as *Cladonia rangiferina* and the two allied species, and also *Cladonia amaurocraea*. Known in all of the grand divisions except Africa.

CLADONIA FURCATA (Huds.) Schrad. var. FINKII Wainio Minn. Bot. Stud. 3:217. 1903. Plate VII. Fig 2.

Podetia rather stout and from 15 to 75 mm. in length and 1 to 3 mm. in diameter, scyphiform and frequently two or three ranked, cortex subcontinuous, usually more or less squamulose even toward the top, whitish sea-green or slightly olivaceous, ultimate branches sometimes quite similar to those of var. *racemosa* but more irregular, quite commonly fruited. Cups irregular and sometimes perforate, commonly proliferate and the cups of the upper ranks not often developed. Apothecia quite commonly present and of the usual size, color and form, occurring frequently clustered and also rarely perforate.

Dr. Wainio has failed to send a description, and I have been obliged to supply the above. However, Wainio states as follows, "Scyphifera te

analoga f. *paradoxae* Wainio, in quam transit, et e var. *racemosa* est evoluta, et in colore congruens."

Examined by Wainio from several localities along or near the northern boundary of Minnesota (Minn. Bot. Stud. 3:217. 1903). Also Nos. 767 and 914 in Minn. Bot. 2:264. 1899, are intermediate between this variety and the last, and are very similar to the C. C. Parry plant examined by Wainio. Not known elsewhere.

CLADONIA FURCATA (Huds.) Schrad. var. PINNATA (Flk.) Wainio Mon. Clad. Univ. 1:332. 1887. Plate VII. Fig. 3.

Podetia rather long and stout, the branching and condition of the axils much as in the next, but usually even less conspicuously branched toward the apex where the sterile branches are more commonly narrowly subulate, rarely decorticate in part, more or less squamulose even toward the top with incised or lobate-crenate squamules, more commonly whitish or sea-green, not isidioid or sorediate as in the next. Apothecia as usual, but not common except in the subvariety *truncata* Flk. Clad. Comm. 145. 1828, to which Dr. Wainio referred my specimen from Minnesota, and which has more obtuse apices of the ultimate branches.

Besides my Minnesota form referred to the subvariety, Dr. Wainio examined a plant from Chester, South Carolina, by H. A. Green, which he referred to the variety and which is figured. Also credited by Wainio from Great Bear Lake, Vancouver Island, New York and Mexico. Though the plant is little known, the widely separate localities would seem to indicate a general North American distribution. Known in all the grand divisions except Africa.

CLADONIA FURCATA (Huds.) Schrad. var. SCABRIUSCULA (Del.) Wainio Mon. Clad. Univ. 1:339. 1887. Plate VII. Fig. 4.

Podetia rather straight and sparingly dichotomously branched (especially toward the apex), apices usually subulate, more or less isidioid or sorediate and also commonly sparingly or even densely squamulose, frequently also with the cortex more or less broken or even partly decorticate, usually whitish to sea-green. Apothecia apparently rare, and scarcely ever present on our American specimens.

Dr. Wainio has determined this for me from Minnesota and Iowa, the Iowa plant having been distributed by me in 1894-5 in the "Lichens of Iowa" as var. *racemosa*, after comparing with material in the Tuckerman herbarium at Harvard. Of this material Wainio says, "*Cladonia furcata* × *C. furcata* v. *scabriuscula*," but I think that my plants distributed all show the varietal characters clearly. Numbers 47 and 51 of Macoun's "Canadian Lichens" I find to be this variety, and I have received it from Newfoundland through A. E. Waghorne. Wainio credits the variety from New Bedford, Massachusetts, under the subvarietal name *C. furcata* var. *scabriuscula*, forma *farinacea* Wainio Mon. Clad. Univ. 1:339. 1887, but I have not seen this form. Not known elsewhere in North America. Known in all the grand divisions except Africa.

CLADONIA FURCATA (Huds.) Schrad. var. PALAMAEA (Ach.) Wainio Mon. Clad. Univ. 1:347. 1887.

Podetia usually dichotomously or subradiately-ramose branched, cylindrical and frequently somewhat thickened toward the axils, sometimes squamulose toward the base, chestnut-colored or brick-red, or olivaceous varying toward sea-green toward the base. Apothecia as usual.

Dr. Wainio says, "Verisimiliter etiam in America septentrionali distributa est (var. *subulata* Tuck., Syn. North Am. p. 248 pr. p.)," thus leaving some doubt as to whether this form of the species is North American. However, Wainio has determined what he regards a subvariety from Minnesota. This is given next below, and I shall regard it as a distinct variety till I have an opportunity of examining specimens of the above, or am able to see more of resemblance than appears in the two descriptions.

CLADONIA FURCATA (Huds.) Schrad. var. PARADOXA (Wainio) Fink Minn. Bot. Stud. 3:217. 1903. Plate VII, Fig. 5.

Podetia rather short, 10-40 mm., and .7-1.5 mm. in diameter, scyphiform, brownish or olivaceous-brown above and sometimes sea-green toward the frequently sparsely squamulose base. Cups 2-3 mm. in diameter and quite abruptly dilated, the cavities perforate or subcribose, irregularly sublacerate-proliferate, the proliferations forming two or three ranks and even the highest rank commonly scyphiform. Apothecia not conspicuously clustered, often perforate, or lobate, brown, convex, immarginate, quite common at least in ours.

Determined by Dr. Wainio from northern Minnesota, where frequent on old wood or thin earth. Otherwise only known in Europe. Seems very near to the first variety of *Cladonia crispata*, below, from which it may be distinguished readily by the difference in color and some features of the primary squamules, which are more commonly persistent in *Cladonia crispata*.

CLADONIA CRISPATA (Ach.) Flt. Merkw. Flecht. Hirschb. 4. 1839.

Primary thallus persistent or finally dying, composed of middling sized digitate-lacinate or crenate squamules, which are 1-4 mm. long and wide, ascending, flat or involute, scattered or rarely clustered and forming a compact crust, lighter or darker sea-green or even olivaceous-brown above and white or brownish below or even reddish below toward the base, the cortex continuous. Podetia arising from the surface of the squamules, the base often dying away and continuing to grow above, 10 to 75 or possibly 100 mm. in length and .5 to 5 mm. in diameter, subcylindrical or irregularly turgescer or even trumpet-shaped, radially or sympodially branched, the branches suberect or spreading, the axils commonly somewhat dilate-open, the cortex subcontinuous or dispersed-areolate and the areoles frequently more or less raised, sometimes more or less squamulose, sea-green or variously whitish, reddish, brownish or olivaceous, most commonly scyphiform, the ultimate branches also scyphiform, or obtuse or subulate. Cups abruptly dilated and frequently perforate, borne at the apices of the branches, repeatedly proliferate at the margin, the species probably not

commonly more than one ranked. Apothecia small, .5-.7 in diameter, at the apices of short branches or at the ends of the proliferations of the cups, subsolitary or subcorymbosely aggregated, immarginate or with thin margin, flat or convex, brown or rarely brick-red. Hypothecium pale. Hymenium pale or pale-brownish below and brownish above. Paraphyses commonly simple, thickened but usually pale at the apex. Asci cylindrico-clavate, the apical wall thickened.

The same in part as *Cladonia furcata* var. *crispata* of Tuckerman's "Synopsis," and Dr. Wainio credits it from Great Slave Lake, British Columbia, Rocky Mountains, Wisconsin, California and Massachusetts, and has determined it for me from Minnesota. This gives a general distribution throughout northern United States and northward. Known in all the grand divisions except Africa.

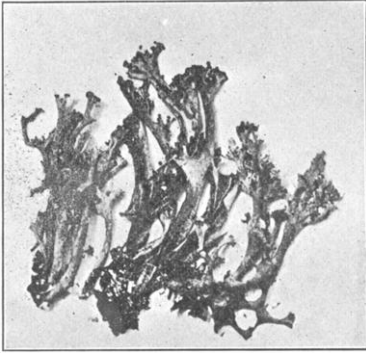


Fig. 2. *Cladonia crispata* var. *infundibulifera* $\times 1$.

trionialis" here. Not known elsewhere from North America. Tuckerman's number 31 was collected in the White Mountains. Known also in Europe.

CLADONIA CRISPATA (Ach.) Flt. var. SUBCRISPATA (Nyl.) Wainio Mon. Clad. Univ. 1:385. 1887.

Podetia about 45 mm. long, scyphiform, sparsely squamulose, suberect or recurved, sea-green. Cups with the cavity usually closed or rarely cribose or perforate, quite regular in form, sometimes irregularly perforate or radiate. Apothecia on corymbrose branches or on the margins of the cups.

Dr. Wainio regards this a strictly North American variety, his note on distribution being as follows, "In partibus Britannicis Americae septentrionalis," but the form is wholly unknown to me.

The material examined is as before from my own collecting, or from my herbarium or the very full one at the University of Minnesota, and was collected by Farlow, Seymour, Miss Cummings, Willey, Calkins, Eckfeldt, Waghorne, Tuckerman, Parry, Green, Commons and others. I have again found the European material sent by L. Scriba very helpful for comparison, but the illustrations are this time all from American plants, examined by Dr. Wainio.

CLADONIA CRISPATA (Ach.) Flt. var. INFUNDIBULIFERA (Schaer.) Wainio Mon. Clad. Univ. 1:382. 1887. Fig. 2.

Podetia rather longer and stouter, sometimes squamulose toward the base, scyphiform, sometimes two or three ranked. Cups perforate, commonly abruptly dilated, 3-6 mm. wide, regular or finally oblique, radiate or proliferate. Apothecia on the proliferations or on short pedicels on the margins of the cups.

Dr. Wainio has determined this variety for me from northern Minnesota, where I have made three collections, and refers number 31 of Tuckerman's "Lichenes Americani septentrionalis" here.

Grinnell, Iowa.